ABOUT THE EXHIBITS

MUSEUM OF COMPARATIVE ZOOLOGY
"AGASSIZ MUSEUM"
HARVARD UNIVERSITY

ABOUT THE EXHIBITS

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MUSEUM OF COMPARATIVE ZOOLOGY
Harvard University
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A Note on How It Started

A plaque in the Museum bears the following legend:

PAST DIRECTORS OF THE
MUSEUM OF COMPARATIVE ZOOLOGY

LOUIS AGASSIZ	1859–1873
ALEXANDER AGASSIZ	1873–1910
SAMUEL HENSHAW	1910–1929
THOMAS BARBOUR	1929–1946
ALFRED ROMER	1946–1961
ERNST MAYR	1961–1970
A.W. CROMPTON	1970–1982

James J. McCarthy became the director in 1982.

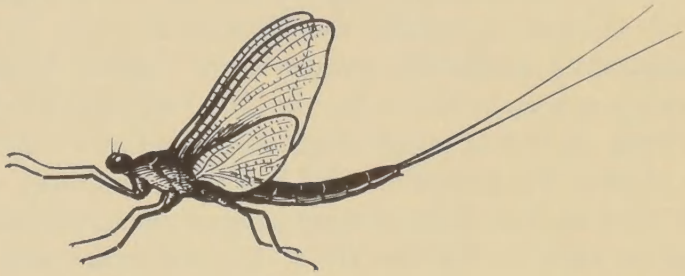
The great scientist at the top of that list, Louis Agassiz (pronounced AG-a-see), founded the Museum in 1859. In his honor the institution is unofficially known as the "Agassiz Museum."

Agassiz was born in Switzerland in 1807, and studied in Germany and in Paris. A man of tremendous vitality and enthusiasm, he won a high place in the scientific world before he was forty, especially for his work on fossil fishes and his brilliant theory of the Ice Age. In 1846 he came to America for a visit, and never went back to Europe to live. In 1847 he accepted a Harvard professorship, and until his death in 1873 he made Cambridge his home — teaching, collecting, exploring, writing, going on lecture tours, and exerting a great personal influence on the growth of science at Harvard University and in the United States. Throughout his life he was often in financial difficulties, partly because he spent so much in scientific work. The first of America's great university museums grew out of his personal collections.

In 1946, a hundred years after his arrival in America, one of his

successors as head of the Museum, Alfred S. Romer, wrote of Louis Agassiz:

"He began teaching when he had hardly stepped off the boat; he continued to teach almost to the day of his death. He could hold an audience of thousands; but he was even more inspiring to a single student poring over a dead fish. With the serious student of zoology his method was that of the laboratory, rather than that of the textbook. Tens of thousands of young students today are introduced to the name of Agassiz by the supposed quotation on their celluloid rulers, 'Study nature, not books.' It would appear that he never said these exact words; but they do express the essence of his teaching. Acute observation of nature replaced the dull pedantry and reliance upon written authority which had persisted from the Middle Ages on into the universities of the earlier 19th century. How many legs has a mayfly? Aristotle said four, and it was so taught for nearly two millennia. But why not look at the fly itself? You will discover that there are actually six. Students responded to this sort of treatment . . ."

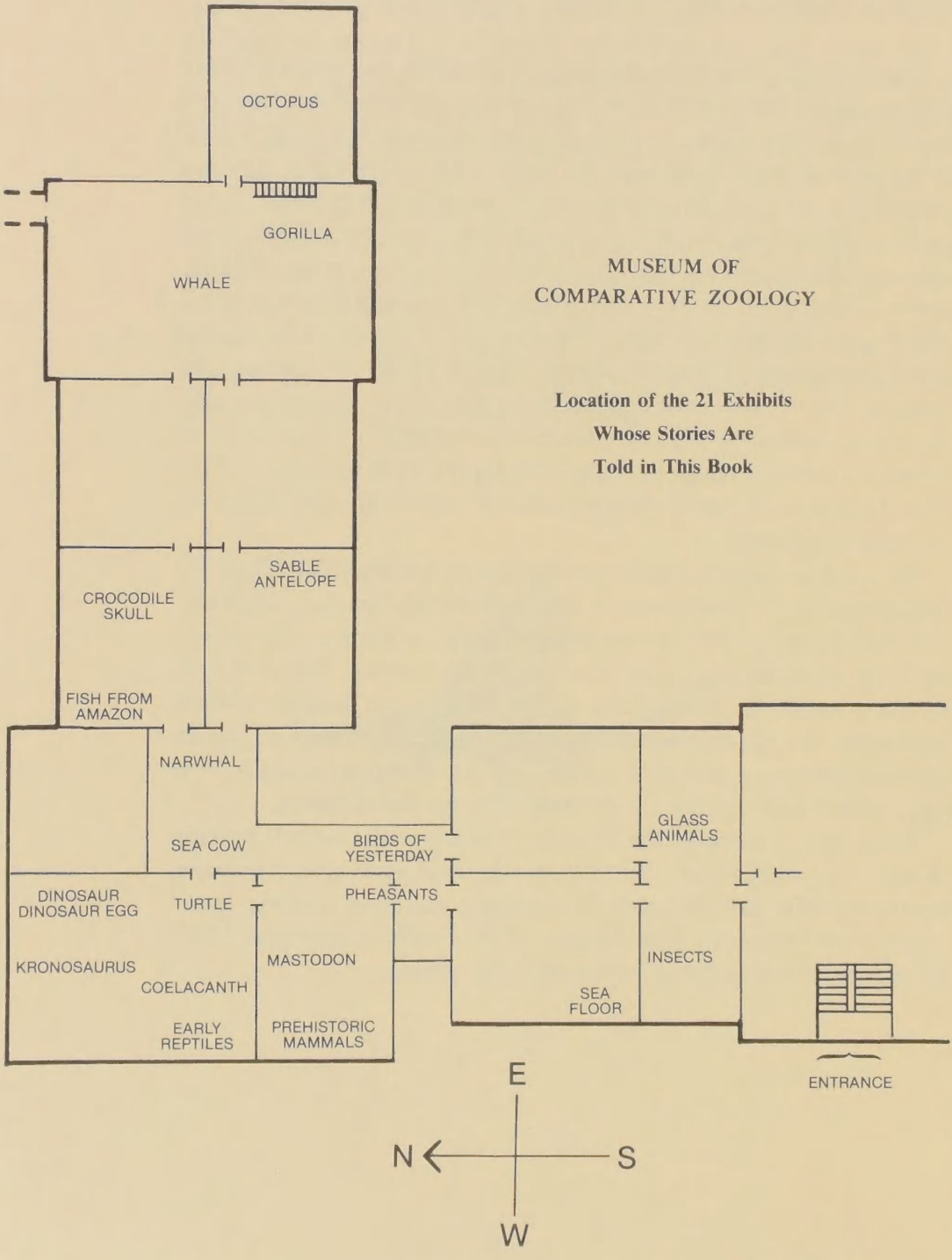


A Note on What Goes On Here

The Agassiz Museum is primarily a teaching and research institution. It teaches Harvard undergraduates and graduate students, and indeed, ever since the days of Louis Agassiz, has been looked to as a central training ground for those who will become curators, researchers, and teachers elsewhere. It issues a steady flow of scientific publications, carries on the endless function of taxonomy (the classification of animals), and studies changes in animal populations. Still another of its major concerns is enlarging man's understanding of animal evolution. Paradoxically, though Louis Agassiz could not accept Darwin's theory of the origin of species, the museum that Agassiz founded has become in the twentieth century one of the leading centers of research on evolution. In recent years it has also been the scene of major developments in ecology and the new discipline of sociobiology, both of which are grounded on evolutionary theory.

For all this, large numbers of specimens are essential. And the collections in the Museum are vast and world-famous. The Museum's collections, like its laboratories and its library, are mainly used by students and scientists behind the scenes. For example, all but a small fraction of its approximately 10 million mollusk specimens, its approximately 6 million insect specimens, and its approximately 250,000 bird specimens are arranged compactly in rooms filled with cabinets consisting of large flat drawers.

Thus, like an iceberg, the Museum presents only a small portion of itself to public view. But this is the most spectacular portion; for the exhibits include many of the rarest and most historic specimens in the Museum. The purpose of this booklet is to give brief, nontechnical stories behind some of these exhibits.



MUSEUM OF
COMPARATIVE ZOOLOGY

Location of the 21 Exhibits
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Told in This Book

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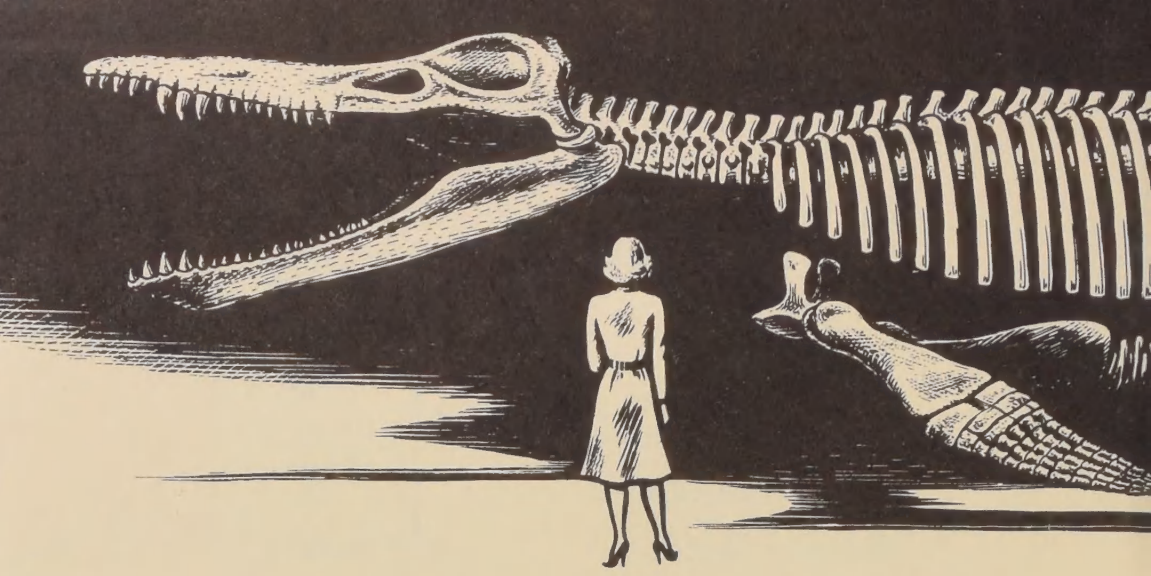
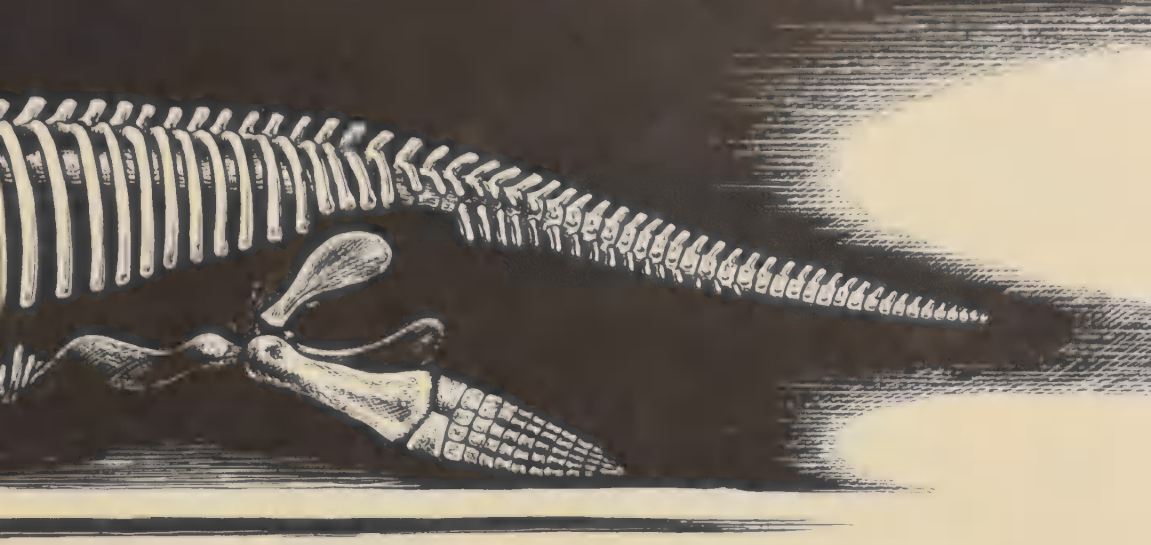


1

Kronosaurus, Ruler of the Seas

In 1931 the Museum of Comparative Zoology sent a six-man expedition to Australia. Thomas Barbour, then director of the Museum, told the press, "We shall hope for specimens of the kangaroo, the wombat, the Tasmanian devil and the Tasmanian wolf." The group returned with over a hundred mammals and many thousands of insect specimens, but the most notable find, a complete surprise, was made in the winter of 1932 by a young scientist who had stayed in Australia longer than the others. He was William E. Schevill, the "fossil man" of the team, a graduate student in his twenties. In a limestone formation on a sheep ranch in North Queensland, more than 200 miles from the seacoast, he found the skeleton of a marine reptile 42 feet long. This skeleton, when extracted from the limestone and finally put on exhibit at Harvard twenty-six years later, became the world's first mounted specimen of *Kronosaurus queenslandicus*, which swam the seas about 120 million years ago.

Credit for discovering and naming the species goes to Heber Longman of the Queensland Museum, who had found some *Kronosaurus* bones several years before the Harvard group visited Australia. The name is derived from *Kronos*, the titan in Greek



mythology who was the father of Zeus, and *saurus*, the Greek and Latin word for reptile. *Kronosaurus* belongs to a group of reptiles known as the plesiosaurs, which were dominant in the oceans while the dinosaurs were ruling the land. The plesiosaurs, eaters of fish, used their huge limbs in the manner of sea turtles. They became extinct about the same time as the dinosaurs. Why they failed to survive is not known with certainty. The species *Kronosaurus* was the giant among the plesiosaurs, and is considered the largest marine reptile that ever lived. Indeed, no known creatures have been larger except some of the dinosaurs and some whales living today.

Schevill, touring likely fossil areas of Queensland in a truck, asked a rancher, R. W. H. Thomas, if he knew of any fossils. Thomas replied that there was something odd sticking out of some rocks in one of his fields. Schevill hurried to the scene. This land had been under water in the Cretaceous period. The big reptile, dying, sank to the bottom and was gradually buried under silt, which hardened to stone. Eventually the sea floor was thrust up and the stone was exposed by erosion. With the ranch owner's permission, the blocks of stone, weighing about six tons, were dug and blasted out, hauled to the coast, and shipped to Cambridge.

The task of freeing the skeleton from its hard case was a staggering one. Lack of money and manpower, and of Museum space, caused long delays. It was 1939 before the skull, nine feet long, was exposed to view and mounted for exhibit. Theodore E. White

did the work. The rest of the blocks lay in the Museum basement for about fifteen more years. Then they came to the attention of Godfrey Lowell Cabot of Boston, the wealthy manufacturer of carbon black, who was then in his nineties and had been interested in sea serpents since childhood.

Cabot was born in 1861, graduated from Harvard in 1882, and died in 1962 in the 102nd year of his life. By heritage he had every right to be fascinated by marine reptiles. In 1817, when reports spread that many people had seen a 60-foot sea serpent in Gloucester harbor, Cabot's great-grandfather, Thomas Handasyd Perkins, merchant prince of Boston, went skeptically to observe for himself. The result was startling. Perkins wrote a vivid account of watching an immense chocolate-colored snake swimming around the harbor, only about 40 feet of its body visible at any one time, in curved bunches separated by about three or four feet of water. The account was published and became a part of family lore. In 1819, Perkins's daughter and son-in-law, Eliza and Samuel Cabot (Godfrey Cabot's grandparents), saw what was apparently the same creature off Nahant. Sea-serpent mania again seized the Massachusetts coast, and for decades sea-serpent watching was a popular sport.

Godfrey Cabot used to question Alfred Romer of the Museum about reports of sea serpents. One day it occurred to Dr. Romer to tell Mr. Cabot about the skeleton in the museum closet. Cabot asked how much a restoration would cost. Romer, pulling a figure out of the musty air, replied, "Oh, about $10,000." Cabot promptly sent a check. After all, *Kronosaurus*, though it has no direct descendants in the oceans of today, was itself a sea serpent of heroic proportions.

The job of restoration consumed the $10,000 and even more. Two years of delicate work with a chisel and acid by Arnold Lewis and James A. Jensen, Museum preparators, brought out the full extent of the skeleton. About a quarter of the bones had been destroyed by erosion, but knowledge of other plesiosaurs made it possible to reconstruct the missing parts with confidence. On June 10, 1958, *Kronosaurus* was unveiled in its present location, its frightful jaws agape.

GREAT AUK

2

Birds of Yesterday

If you are a bird watcher you will scarcely hope to spot a Great Auk, Passenger Pigeon, Heath Hen, Labrador Duck, Carolina Parakeet, Guadalupe Island Caracara, California Condor, Eskimo Curlew, Whooping Crane, or Ivory-billed Woodpecker. All these are North American birds that are extinct, or *almost* extinct. And they all stand together in a proud group in the Museum.

The oldest specimen in this strange little flock is the Great Auk (*Alca impennis*), sometimes known as the Penguin of the North Atlantic, whose kind died out in the nineteenth century. Plenty of auks remain, but not the Great Auk. A former curator of birds at the Museum, James C. Greenway, Jr., said in his book *Extinct and Vanishing Birds of the World* that the last capture occurred in 1944, off the coast of Iceland. Perhaps eighty mounted specimens exist today, two of them at Harvard. The one on exhibit, which is

about 2 feet high, was given to the Museum in the 1930's by John E. Thayer, of Lancaster, Massachusetts. Thayer, one of the Museum's great benefactors, also gave the collection displayed in the Thayer Hall of North American Birds, which contains every species north of Mexico. He bought the Great Auk from a British private collection in 1905; it had changed hands several times before that, the earliest known transaction having been in 1838. Great Auk eggs are even rarer than Great Auks; there are thought to be seventy-three in existence.

In the eighteenth century, Great Auks were commonly seen in various parts of the North Atlantic, including the Grand Bank of Newfoundland. The bird's misfortune grew out of the following circumstances: it was good to eat; its feathers were valuable; the fat in its body was used for fuel; it liked to congregate densely at breeding places; and — worst of all — its wings were too short for flight. Indeed, the Great Auk was the only North American bird incapable of flying. In 1785, Captain George Cartwright visited the Great Auk's breeding colony on rocky Funk Island, a mere dot on the map east of Newfoundland, and watched the inhabitants of Fogo Island who had come in boats to collect birds and eggs. They "lay their gang-boards from the gunwale of the boat to the rocks," he wrote in his diary, "and then drive as many penguins on board, as she will hold."

A century ago, Passenger Pigeons were so numerous that it sometimes took several days of continuous flying for a single blue flock to pass over a given place. They nested so densely in trees that they left whole forests in disarray. But these birds had breasts that made good eating, and for this and other reasons they became favorite targets for Americans. The last survivor died in a Cincinnati zoo in 1914.

Raymond A. Paynter, Jr., Greenway's successor as curator of birds, explains that humankind can doom a species without killing every member. If the victims are social nesting birds, like Great Auks, Passenger Pigeons, and Heath Hens, people have to slaughter only enough to bring the population below a critical mass which seems necessary for reproduction. Such birds are stimulated by gathering in large numbers so that males can noisily advertise themselves and females can select.

Heath Hens (actually only a subspecies, close kin to the Western Prairie Chicken) vanished from the mainland in the middle 1800's

and survived in their last refuge, Martha's Vineyard, until 1932.

The Labrador Duck was never abundant, and, according to Dr. Paynter, may even have become extinct for reasons not related to mankind, as animal species have been doing throughout the millions of years of evolution. At any rate, the last recorded capture of a Labrador Duck occurred in 1875 on Long Island, and only about forty museum specimens now exist.

Not since 1920 has a sighting of a Carolina Parakeet been reported. Its gaudy plumage and destructive habits contributed to its downfall.

The Guadalupe Island Caracara was deliberately exterminated before 1900 by goat herders on its home island off the west coast of Mexico. The story goes that the herders had seen Caracaras eating baby goats and thought the birds had killed them. If this belief was behind the crusade, an injustice was done; for those birds were scavengers, not killers of baby goats. Just nineteen museum specimens are thought to exist today, three of them at Harvard.

The other species shown in the "birds of yesterday" cabinet cling to life, precariously, in small numbers.

3

Mountain Gorilla

A young zoologist in the Harvard African Expedition of 1926–27, Harold J. Coolidge, Jr., roamed the steep, thicketed mountain ridges of the eastern Congo, determined to collect a Mountain Gorilla (technical name *Gorilla gorilla beringei*). With him were fifteen Pygmies and eight other Africans, making up what he later called "a quite large and useless army." Though they were less than two hundred miles south of the equator, the air was raw and the rain was cold, for the altitude was over 8,000 feet. "The ants and crawling insects," Coolidge reported, "sought refuge in my soggy blankets which made a squdging noise every time I rolled over in the mud."

Twice they came to close quarters with gorilla troops. In each case, the animals, showing aggressiveness that was "contrary to

most accounts I have read," made a concerted rush within ten feet of the hunters and then stopped or swerved aside. On the final day of the hunt the men picked up a fresh trail of a third troop. Near the bottom of a ravine, about twenty men and about twenty gorillas stayed motionless for twenty-five minutes in a dense bamboo forest, not 150 feet apart, waiting each other out. Suddenly one of the Africans coughed. There came a fierce chest-drumming, evidently from the male leader of the troop, and the gorillas quietly withdrew and climbed to the top of a lofty ridge. The men crossed the ridge about five minutes after the gorillas.

"I at once started to follow one trail far bigger than the others," Coolidge wrote. This fellow's trail led downhill, so steeply in places that he had slid some distance sitting down. The gorilla stopped behind a large tree and rushed away as Coolidge approached. Coolidge fired. From then on, the spoor trail showed traces of blood. The animal zigzagged, choosing the densest places. Coolidge with the Pygmy chief crawling almost between his legs covered only about a hundred yards in an hour. A low growl just ahead sent the Pygmy fleeing, and at fifteen feet Coolidge hit the black shape a second time.

"No native would follow the track any longer so I did my own spooring. Not ten minutes after my second shot I was slipping down a rather steep slope with bad footing. Suddenly I noticed directly in the line of the track a large tree and, crouched against it facing me, a huge black form. His head was well forward as if he were ready to spring. At that instant I slipped and sat down hard, with no little difficulty preventing myself from sliding down into the arms of the waiting old man, only twelve feet away. I fired sitting as I was, at where his heart ought to be. He fell over dead.

"I had to take off my hat to this old king who handled his troops so well, covered the rear of the retreat, and took his medicine like a man. The first bullet was in his shoulder, the second in his stomach, and the third had broken the jaw on the way to the heart. At this juncture the skies opened in sympathy for him, and it has seldom, if ever, rained so hard."

This is the animal that now stands in the Museum, looking as if about to drum his great chest. That chest measures 5 feet 2 inches in circumference. The body length is 5 feet 8¼ inches. The weight of the animal when alive is unknown, but Coolidge estimated that it was close to 475 pounds.

4

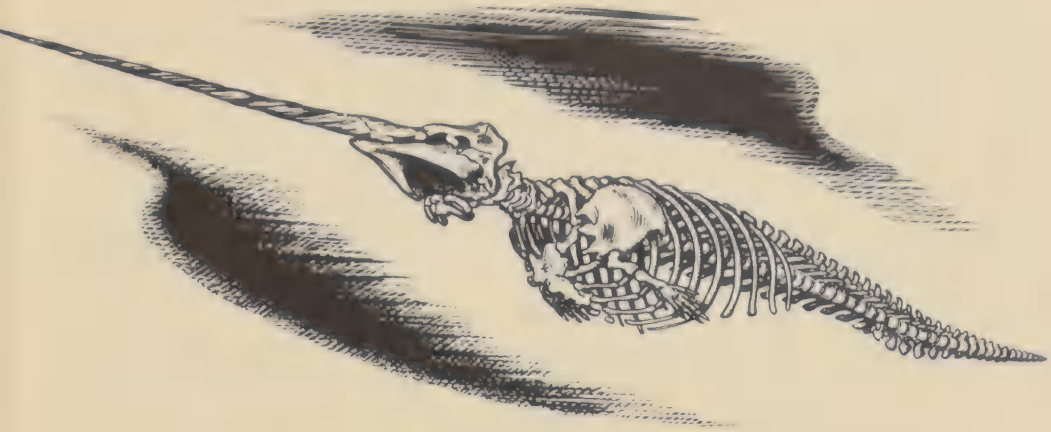
The Narwhal, or Sea-Unicorn

One of the world's favorite legends is that of the unicorn. Century after century, people believed in the wondrous horse-like creature with the long, straight horn on its forehead. In modern times this notion has continued to affect literature, art, and coats of arms. The legend originated somewhere in the Orient. Europeans of the Christian era adopted the unicorn as a symbol of Christ. The horn was believed to have special qualities, such as preventing diseases and detecting poison. During the Middle Ages and Renaissance, monarchs and a few fortunate institutions actually owned unicorn horns, or so they thought, and considered them many times more valuable than their weight in gold. For example, in 1458, New College, Oxford, had what the college records called a "unycornys horne," 6 feet 9 inches long, and the processional cross was borne upon it during ceremonies. In 1576 the Earl of Leicester, a favorite of Queen Elizabeth, saw this horn and asked for it. The college authorities, in a dilemma, compromised by giving him the tip of it, a fragment 16 inches long. He was so proud that he had his portrait painted clutching the precious object.

In the early 1600's the secret began to trickle out. Learned men discovered that a "unicorn's horn" was not a horn at all, but a tooth, and it came from a small Arctic whale called the narwhal. A narwhal typically has only one tooth — or tusk if you prefer. Scandinavian fishermen, those bold enough to invade ice-crowded seas, had been occasionally bringing back these spear-like tusks and quietly selling them at large prices. The news took a long time to spread among the public. Carolus Linnaeus gave the narwhal the technical name that still sticks to it, *Monodon monoceros*, which means "one tooth, one horn," though Linnaeus well knew that the protuberance was not a horn.

Today an exceedingly rare skeleton of a male narwhal, 23 feet long including its tusk of 6 feet 11 1/2 inches, is on exhibit in the Agassiz Museum, and nobody knows exactly how it came there. Apparently it matriculated at Harvard before the Museum was founded.

A narwhal, sometimes called a sea-unicorn, is one of the least



THE MUSEUM'S NARWHAL SKELETON

understood of all large animals. Like other whales, it is a mammal. It is close kin to the beluga, or white whale (*Delphinapterus leucas*), another Arctic inhabitant; and indeed they are the only two living species in a whale family known as Monodontidae. But the beluga has no such tusk. The narwhal's tusk grows out of the left side of its upper jaw and is unusual in being straight. Elephant tusks curve, walrus tusks curve, and even our own teeth curve a little and would curve more noticeably if they were longer. The narwhal's tusk is spirally grooved, like a screw, and has a left-hand thread; that is, the spiral goes in a leftward direction. How does it grow that way? Why does it ordinarily appear in the male only, and only in the left side of his mouth? Why does the animal have no other developed teeth?

Once in a great while a narwhal is seen with a second tusk protruding on the right side (the British Museum displays a skull with twin tusks 6 feet long), but, surprisingly, this is said to happen only in *females*, which normally show no tusks at all. Even more remarkable, the spiral goes in the same left-hand direction on both

HOW A NARWHAL LOOKS IN THE FLESH

of her tusks, in contrast to other such pairs in nature, which are always mirror images of each other, like the horns of antelopes and goats.

Perhaps most mysterious of all, what does the narwhal use the tusk for? To spear its food? To break the ice? To fight? Some recent investigators think that the tusk is most likely used in fighting among males for female favor.

A long search in the Museum's records has turned up only one reference to the narwhal specimen, despite its rarity and importance. An early catalogue in the mammal department says, without giving a date, that the specimen was collected by Dr. E. K. Kane in Arctic seas. This fact, though skimpy, is intriguing; for Elisha Kent Kane of Philadelphia, a medical officer in the U.S. Navy, was one of the leading Arctic explorers of all time.

Kane died in 1857, two years before Louis Agassiz founded the Museum of Comparative Zoology. His life lasted only 37 years but it was filled with exploits — in the Mexican War and on several continents. His greatest renown came from two Arctic expeditions in search of the lost British explorer Sir John Franklin. On the first voyage, in 1850 and 1851, Kane was the chief medical officer. On the second, in 1853–1855, he was in full command, and his party went up the west coast of Greenland much closer to the Pole than other explorers had reached. His best-selling books about the two harrowing voyages excited the public, which mourned his death as it usually mourns fallen presidents.

In his second book he says he presented a "noble specimen" of a narwhal to the Academy of Natural Sciences of Philadelphia in 1851 after his first voyage. He does not say how he obtained the skeleton. For a while we nursed a hypothesis that the Academy later either gave, sold, swapped, or lent this specimen to the Agassiz Museum and therefore that the skeleton now suspended from the ceiling here swam to Cambridge by way of Philadelphia. But we became satisfied that the specimen Kane gave the Academy was still at the Academy in 1975, though not on exhibit. Its tusk is 8 feet 2 1/2 inches, more than a foot longer than the tusk adorning the Harvard specimen.

Where does this leave the Harvard specimen? Was it really from Kane? There seems no reason to doubt it. We are forced to the

supposition that Kane brought back *two* narwhals, donated the larger one to the Philadelphia institution, and sent the other to Louis Agassiz for his personal collections, which formed the basis of the Museum of Comparative Zoology in 1859. By the way, the Museum has a skeleton of a beluga or white whale (not on exhibit), also catalogued as having been collected by Kane in the Arctic. This too bears no date, and it too was very likely owned by Agassiz before the Museum came into existence. To be sure, the narwhal and beluga could have traveled from Kane to Cambridge via intermediaries, but there is nothing implausible in thinking that the intrepid doctor was not only the collector but also the donor. Thanks to him, Philadelphia and Cambridge have treasures that five centuries ago would have awed any king or queen.

5

The Glass Menagerie

Most animals can be induced to stay lifelike after death, if somebody really wants to do it. Insects are easy. Creatures with scales, feathers, fur, or thick hide can get artificial eyes and interiors and stand around indefinitely.

But what about the soft-bodied of the world, like jellyfish, worms, and squids? They too can be preserved by modern methods, but in the nineteenth century, the alcohol era, they could not; for in alcohol they shrink and change color. Even many of the echinoderms (ee-KINE-o-derms) lose their beauty in alcohol, though the very name echinoderm means "spiny skin."

This fact of life (or death) was a problem a century ago when great museums were rising and naturalists on voyages were finding vast numbers of strange zoological forms. Therefore Alexander Agassiz, who took charge of the Agassiz Museum in 1873 upon the death of his father, Louis, was pleased when he heard about a man in Germany who was making glass models of soft-bodied animals for European museums.

This man was Leopold Blaschka, a goldsmith from Bohemia, who

had moved to Dresden in 1863 and started making glass replicas of coelenterates (se-LENT-uh-rates) for the museum there. Blaschka did not always have zoological specimens in front of him. He depended heavily on drawings made by himself and others.

In the Agassiz Museum's library is an eight-page catalogue of Blaschka's marine animals. It is undated, but apparently Agassiz deposited it in the library in 1877. In his annual report for 1880–81 he announced the purchase of a "complete series" of Blaschka's echinoderms and coelenterates. In his report for 1885–86 he said a large number of glass models had been added. Many of these were mollusks. By this time Leopold Blaschka's son, Rudolph, about thirty and educated in zoology and botany, was side by side with him in their studio near Dresden.

Another fact of death: plants, too, are perishable. In 1886 Harvard's Botanical Museum, headed by George L. Goodale, was planning its present building, an extension of the structure housing the Museum of Comparative Zoology on Oxford Street. Goodale was puzzling over how to exhibit plants systematically to interest the students and the public in plant evolution.

The Blaschka animals in museums on both sides of the Atlantic gave him the answer. He visited Dresden. The Blaschkas, under contract with two benefactors of Harvard — Elizabeth C. Ware and her daughter Mary Lee Ware — spent the next fifty years creating the famous glass flowers. (Leopold died in 1895, Rudolph in 1939.) The flowers, unlike the animals, are found only at Harvard.

As for the glass menagerie in the Agassiz Museum, some of the models are on exhibit today, including models of:

Sea cucumbers, implausible animals which are in the phylum Echinodermata and which live sluggishly on the sea floor. (Phyla are the great tribes into which scientists have divided the animal kingdom.)

The amazing Portuguese man-of-war, which is in the phylum Coelenterata and which consists of a gas-filled float from which dangle long, poisonous tentacles.

A small squid and small octopus, members of the phylum Mollusca.

6

The Crocodile Skull

One day in 1831 a French plantation owner on the Philippine island of Luzon, Paul de la Gironière, and an adventurous American merchant who was staying with him, George R. Russell, led a small army of natives against a giant salt-water crocodile (*Crocodylus porosus*) that had been terrorizing a river mouth. As a result the Museum of Comparative Zoology today possesses what may be the largest crocodile skull of a living species (see picture).

With his own eyes the Frenchman had seen the reptile attack a horse and rider that were crossing the river. The horse escaped because the monster's jaws closed on the saddle and tore it off. The man, one of the shepherds on the plantation, swam to shallow water, got behind a fallen tree with cutlass in hand, and waited, despite the pleas of his friends to run. The crocodile advanced. The cutlass rained harmlessly on its head. The crocodile made a spring and seized the man by the thigh. For more than a minute, Gironière reported, he beheld his poor shepherd, body erect on the

surface of the water, hands joined, eyes turned to heaven, being dragged to his death. His tomb was the crocodile's stomach. About two months later the same creature seized and devoured a horse (found later in his stomach in only "seven or eight pieces"). This precipitated the showdown, for which Gironière and Russell were now ready.

Years after the battle, the two men independently published accounts which, though different in some minor details, are essentially alike. The river mouth was blocked off by nets stretching from bank to bank. Russell and Gironière, with their guns, stood on opposite banks. Indians armed with lances probed the river bottom with bamboo poles. They stirred up the crocodile, which swam against the nets, then surfaced. A shout of joy. Bullets bounced off the monster's scales. A few lances penetrated between those scales. The monster's furious movements broke off the staves, leaving the metal points in his flesh. "Growling," "foaming at the mouth," and gnashing his teeth, he repeatedly rushed the banks and was diverted with lances, bullets, and poles. At one point Gironière thrust his gun within a few inches of the enormous open mouth and fired both barrels into it. The struggle went on for more than six hours. Finally an Indian in a piroque struck the crocodile in the middle of the back from above with a lance of unusual strength and size. Another Indian dealt two vigorous blows with a mace upon the butt-end of the lance, driving it deep. Swiftly the monster swam toward the nets and ripped through two of them, but could not get through the third. His strength was gone at last.

After lassos were applied, it took forty men to drag the creature partway onto the shore. By now it was dark, and measuring the animal was difficult. Both Russell and Gironière measured the girth just behind the front legs and found it to be 11 feet. The distended belly was even larger. The length is not precisely known; the Frenchman recalled that Russell measured it at 27 feet; Russell said that the measurement showed 22 feet but that the tail was under water and he doubted the good faith of the Indian who helped him — and he believed the actual length to have been about 30 feet. The night had become stormy, and Russell and Gironière decided to take the head and leave the body to the Indians. Russell recalled that the head weighed nearly 300 pounds, but Gironière, who said he weighed it himself, recalled 450 pounds. He said it was 5 feet

6 inches from the nose to the first vertebra. (They expected to measure the entire skeleton later, but, according to Russell, a typhoon swept it away before that could be done.) The stomach was cut open, revealing not only the horse but also a large number of stones, weighing, according to Gironière, a total of about 150 pounds.

The Frenchman had no means of preserving the head; but he presented the skull to his friend Russell, who observed later that "the head as it now appears, conveys a feeble impression of the size before it was divested of its integuments." Russell deposited the skull in the Boston Museum of Natural History.

Almost a century later, in 1923, his grandson, Professor Theodore Lyman, and Dr. Thomas Barbour, then director of the Museum of Comparative Zoology, identified an old unlabeled skull in the Boston institution as that of the defeated Philippine monster. This skull, nearly 3 feet long, was given to Harvard where it is the only remaining relic of the battle of 1831.

7

An Astonishing Turtle

The sun, almost directly overhead, made the Venezuelan desert into a frying pan. The month was August 1972. The Caribbean Sea foamed less than three miles away but you wouldn't have suspected it. The scene consisted mainly of dust, rocks, cactus plants, thorn scrub, and six tired paleontologists poking around for signs of ancient life — for traces of animals that had passed that way millions of years before. The searchers would not have felt so weary if they had known they were about to behold the largest species of turtle ever discovered.

Three of the group were from Harvard, the other three from Stockton State College in Pomona, New Jersey. Their expedition was headed by Professor Bryan Patterson of Harvard. It was financed by the National Science Foundation and jointly conducted by the Museum of Comparative Zoology and the geology department of the Universidad Central de Venezuela (Central University of Venezuela).

The turtle expert of the party, Professor Roger C. Wood of

Stockton State, a former student of Patterson's at Harvard, was thinking of lunch. One of his own students, Robert Repenning, called to him from nearby. Wood walked over, took one look, forgot about lunch, forgot about the heat. Protruding from the side of a little hill was a petrified turtle shell. Only a small piece of it showed, but enough to suggest a reptile of fantastic size. The rest of the shell was covered so deeply with rock that several days of pick-and-shovel labor were required before its full extent could be seen. The length (at mid-line) turned out to be 7 feet 2 inches. The specimen belonged to a species hitherto unknown. Later in August the party found an even larger but less complete shell of the same species, about 7 feet 7. The first shell was put on exhibit in the Museum at Harvard – at first vertically, as in the picture, later lying flat. The larger one became the property of the Museo de Ciencias Naturales in Caracas, Venezuela.

Professor Wood has named the animal *Stupendemys geographicus*. The name of the genus, *Stupendemys*, comes from Latin and Greek words meaning "astonishing" and "turtle." He chose *geographicus* as the name of the species in recognition of the support which the National Geographic Society has given to his researches on turtles. His tentative estimate is that these creatures lived about five or six million years ago. They were aquatic (whether salt water or fresh water is not certain) and awkwardly dragged themselves on shore only to lay eggs. *Stupendemys geographicus* is clearly larger than the largest fossil turtle ever reliably reported before (*Archelon ischyros*, 6 feet 4) and the largest *living* turtle ever reliably reported (*Dermochelys coriacea*, or leatherback, 5 feet 9).

But much work had to be done before such conclusions were reached. Arnold D. Lewis, chief preparator of the Museum, was a member of the expedition. Under his supervision the first specimen had to be broken into more than thirty pieces for handling and shipment. The second shell was already in pieces when found, and in fact no one knew which was the larger until they were assembled and studied in the basement of the Agassiz Museum. There, Lewis and his assistants worked for many months to get rid of the remaining rock clinging to the fossils and to put them back together in jigsaw puzzle fashion. He used plaster and fiberglass to make the connections and fill the gaps. The Agassiz Museum put the 7-foot-2

specimen on exhibit in July 1974. It was one of the last major jobs Lewis did in his twenty-three years at Harvard, for in 1975 he moved to Washington and took charge of the vertebrate fossil laboratories of the National Museum.

Stupendemys was only one of the remarkable finds of the Patterson expedition to Venezuela. Among the others was a series of ancient crocodile skulls that dwarf all modern crocodiles. These skulls, like the 7-foot-7 turtle shell, were shipped to Cambridge for preparation and study before being returned to Venezuela. One of them is 6 feet long and contains 96 teeth.

8

Insects Large and Small

When Nathan Banks became Curator of Insects in 1916 the Museum's insect collection was already so large that he spent much of his time for eight months merely becoming acquainted with what he had and how it was arranged. Specimens continued to roll in year after year — from Harvard expeditions, from private collections, from the activities of individual scientists on their world travels and in their back yards — so that today the number of specimens is estimated at around 6,000,000. Why collect so many insects – why not just one or two examples of each species? The answer, or part of it, is that only by assembling many individuals of a species can scientists study its geographical distribution, the variations among individuals, and the transformations during the life cycle.

It is impractical to display huge numbers of duplicate specimens to the public. Accordingly, Curator Banks in 1928 announced one of the world's best "synoptic" exhibits of insects – an exhibit giving a general view. It contained 2,240 species, arranged by orders and families. Most of the species in the cases were represented by a male and female, side by side. This collection was shown for about forty years, until it was supplanted by a more compact display. The present display is even more compact.

The smallest insects are naturally the most difficult to exhibit. Some are so tiny that ordinarily they are not seen at all. The smallest winged insects are wasps of the family Mymaridae, or "fairy flies." Some species are about 1/100th of an inch in body length and about the same in wing spread. A wasp of the genus *Alaptus* looks no bigger than a faint dot made with a sharp pencil. Under a regular microscope it is easily recognizable as an insect, but an electron microscope is needed for a thorough study of its anatomy, and thus the description of these infinitesimal animals is one of the rapidly advancing fields of entomology.

A good many insect specimens are still to be seen in the exhibit area of the Museum, including some whoppers. Examples of conspicuous insects are:

HERCULES BEETLE
LESS THAN
LIFE SIZE

A hercules beetle (*Dynastes hercules*) about 5 inches long counting its fantastic, curved, forward-protruding horn. This is the specimen pictured here, wings in a spread position. It is from tropical America — collector no longer known.

A goliath beetle (*Goliathus giganteus*) about 4 inches long and massive in build. It was sent to the Museum from the Cameroons, in West Africa, by a Harvard alumnus, the Rev. George Schwab, a Presbyterian missionary with unflagging enthusiasm for things zoological.

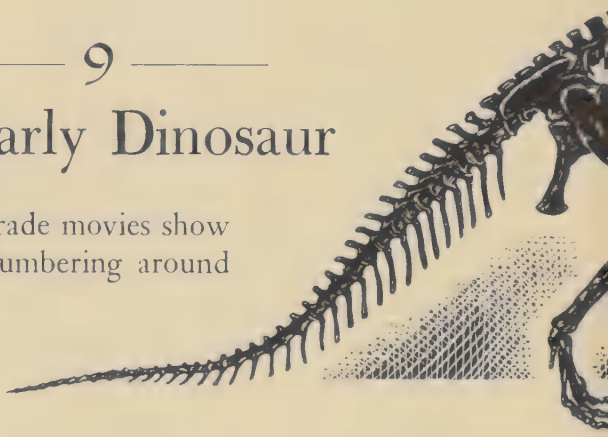
An atlas moth (*Attacus atlas*) with a wing spread of about 8½ inches. It came from the R. M. Grey collection, and before that from the East Indies.

A gray insect (*Bacteria uncinata*) with head and body over 7 inches long — well over 10 inches counting the antennae. It is of the family Phasmidae, popularly called "walking sticks," and it does look like a stick. It was collected somewhere in the tropics — nobody knows by whom.

A 4-inch brown beetle (*Titanus giganteus*) which was brought back from Brazil by Harvard's famous Thayer Expedition of 1865–66. This expedition, named after Nathaniel Thayer, the benefactor who made it possible, was led by Louis Agassiz himself. The emperor of Brazil welcomed the large company of scientists and treated the expedition as a national undertaking. "With such facilities," Louis Agassiz wrote later, "it is not strange that we should have made larger collections than have ever been got together in the same time before." One of the young scientists on the expedition was William James, then in his early twenties. He and another man were assigned to attend to the insects, and James himself collected a great many specimens. So *Titanus giganteus* may possibly owe its presence at Harvard to a man who became a great psychologist and philosopher.

9

An Early Dinosaur



Comic strips and low-grade movies show dinosaurs and cave men lumbering around on the same landscape. But man got here too late to gaze upon live dinosaurs — about seventy million years too late. Dinosaurs ruled the land portion of the earth for more than 100 million years, and this immense span of time witnessed the evolution of dinosaurs having many different shapes, sizes, and habits. But man knew nothing about these dominant reptiles until certain discoveries in England in the 1820's. It was in 1842 that Sir Richard Owen named them *Dinosauria*, or "terrible lizards" (though they are closer kin to modern crocodiles than to lizards). True, Massachusetts citizens had been coming across dinosaur footprints in the rocks of the Connecticut River Valley since the beginning of that century (some of these are on exhibit in the Museum) but they had

believed them to be the tracks of large birds. Decade by decade the exciting dinosaur story unfolded. The western part of the United States was found to be especially rich in dinosaur fossils, but all continents contributed to the expanding body of knowledge.

On exhibit in the Museum is the skeleton of an important dinosaur — not one of the largest but one of the earliest. Plateosaurus, a plant-eating dinosaur about 20 feet long, lived in the late Triassic period about 180 million years ago. It was ancestral to such bulky dinosaurs as Brontosaurus and Diplodocus. The genus Plateosaurus was identified in 1837, but the species mounted in the Museum, *Plateosaurus quenstedti* Huene, was first described early in the twentieth century by Friedrich von Huene of the University of Tübingen in southern Germany.

Edwin H. Colbert, in his book *Dinosaurs: Their Discovery and Their World*, calls Professor von Huene "one of the great and prolific modern students of the dinosaurs." Von Huene's discovery and excavation of some almost complete skeletons of Plateosaurus near Trossingen in Württemberg, about seventeen miles from the Swiss border, was a great find, Colbert relates, for it provided the material for a detailed knowledge of the genus and of an entire branch of dinosaurian evolution.

Von Huene, in a letter to the Museum early in 1964, when he was eighty-nine years old, recalled that the excavation began in 1903, that the species *Plateosaurus quenstedti* Huene was first described in 1905, that several skeletons were excavated from the same spot, and that some of them are still at Tübingen. Work went on at the site from time to time over a long period, and one cannot be sure of the date when the Harvard skeleton was excavated. The Harvard skeleton was obtained from Tübingen in exchange for other specimens, and was put on exhibit here in 1932.

10

Giant Sable Antelope

For many years naturalists had been puzzled by an enormous horn hanging in a museum at Florence, Italy. It seemed to be from a Sable Antelope, but it measured 61 inches, a foot longer than the biggest Sable that had been shot. The mystery was solved in 1913, when H. V. Varian, chief engineer of a railroad in the Portuguese colony of Angola, in western Africa, discovered a new subspecies which became known as the Giant Sable Antelope *(Hippotragus niger variani)*.

This black glossy creature with white splashes on its face is considered the king of the antelope world. The record specimen, in the Madrid Museum, has a horn of 64⅞ inches. The subspecies, found mainly on a wooded tableland about a hundred miles long between two rivers in central Angola, is one of the rarest animals in Africa. The number is estimated at fewer than 2,000. The penalties for shooting one today are severe.

During the two decades after the discovery of the Giant Sable, four American hunting parties went after it and brought back a few specimens. The fourth expedition — in the early 1930's — was that of Prentiss N. Gray, of New York. Early one morning, in dense bush, he spotted and killed a bull antelope with horns 61¼ inches long. This one was destined for the Academy of Natural Sciences of Philadelphia. But, as Gray wrote later, "We had traveled only about half an hour on our way back to camp when we spied a herd of sable feeding in an open park. There were eight cows, a calf, and a grand, black, old bull." This bull is the beautiful animal now in the Agassiz Museum and pictured here. It took Gray five shots and a hard chase to put it down to stay. Its horns are precisely 60 inches long and 10 inches around at the base.

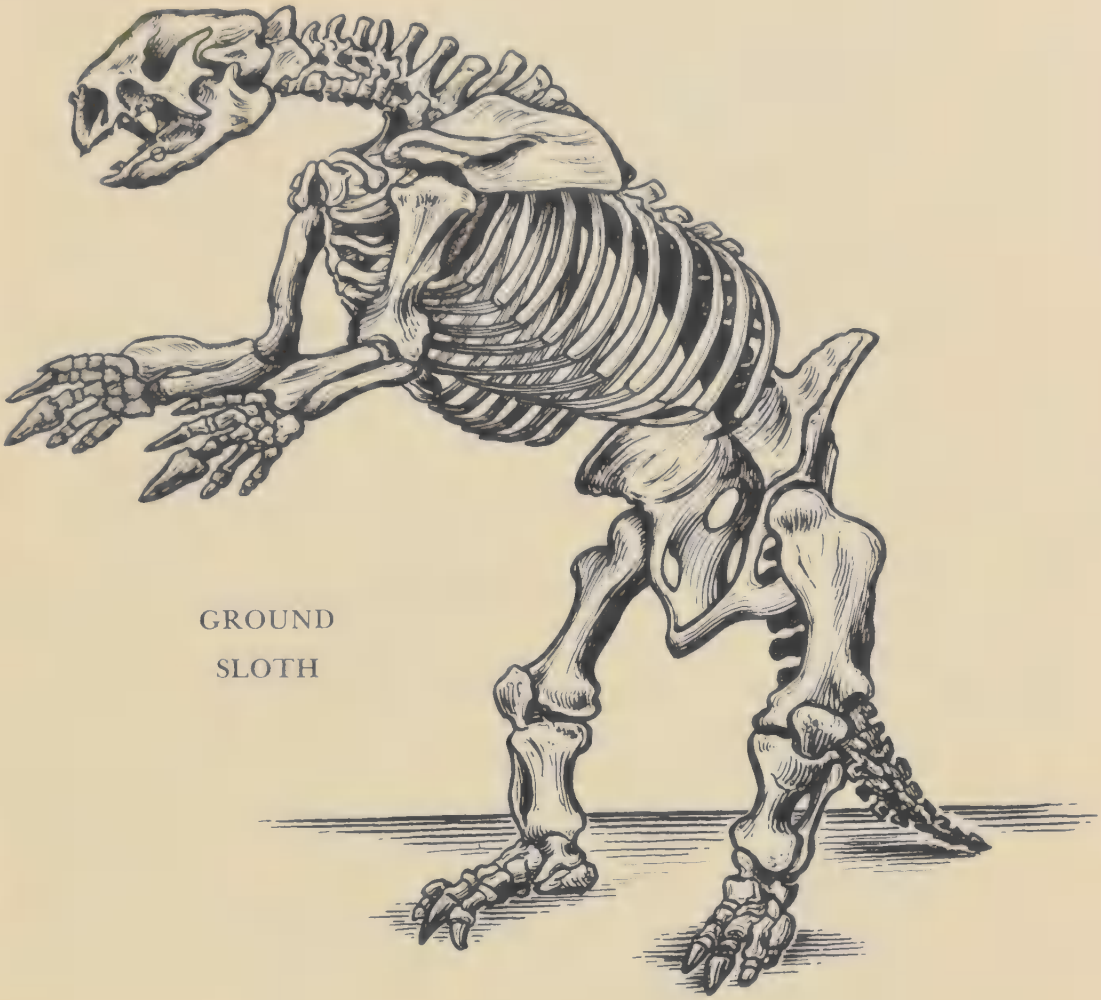
After Gray gave it to Harvard, Edward Mallinckrodt, Jr., of St. Louis, donated the money to have it mounted. The work was done by James L. Clark of New York, and the result, put on display in 1933, is considered one of the finest mounts in the Museum.

11

Prehistoric Mammals

There are many ways to get specimens for a museum; and when a man who is zealous to advance knowledge is engaged in building a great collection he is likely to use nearly all of them. He will travel — and send others — to far places to dredge up, dig up, net, or shoot the rarest of the rare. He will encourage collectors to give or bequeath their treasures. He will swap his duplicate specimens for those of other institutions. Being honorable, he will not, of course, resort to theft (but Alexander Agassiz, one of the mightiest museum builders, is said to have had a whale pilfered from him by a rival scientist). Finally, if he has money, he will buy, buy, buy. And at what emporium will he buy? Well, in the last third of the nineteenth century, if he wanted something really hard to get, like a skeleton of *Lestodon armatus*, the 15-foot-long extinct ground sloth pictured here, he bought it, almost as a matter of course, from Professor Henry A. Ward, of Rochester, New York.

Ward was born in Rochester in 1834. At twenty he was a pupil of Louis Agassiz at Harvard. He went next to Paris, where, for several years, he financed his scientific studies by selling specimens of fossils to European museums. In his thirties, as a professor at the University of Rochester, he founded Ward's Natural Science Establishment. Leaving the university, he built this company into a world-famous institution for gathering and preparing scientific specimens. But he never got rich, for his expenses were huge; he himself made about fifty ocean voyages, and he sent other men on fantastically expensive errands. Ward's became the center of taxidermy in America. A number of the young men he employed, including W.T. Hornaday, Carl E. Akeley, William M. Wheeler, and Frederick A. Lucas, went on to distinguished careers. One of them, Hornaday, in an article in 1896, wrote that Ward "has done more toward the creation and expansion of the scientific museums of the world than any other twenty men I could name." Hornaday said Ward had sold $730,233 worth of specimens to one hundred museums in the United States alone. The museum at the top of the list was the Field Museum in Chicago (later to become the Chicago Natural History Museum); Marshall Field had founded this insti-



GROUND
SLOTH

tution full-blown by writing a check for $100,000 for the Ward exhibit at the World's Columbian Exposition of 1893 — an exhibit big enough to fill twenty-one freight cars. The museum with the second largest account at Ward's — $70,560 — was Harvard's Museum of Comparative Zoology.

Though Hornaday did not say so, the Harvard funds had come largely out of the pocket of Alexander Agassiz, then head of the Museum. And it was only a fraction of the money that this man spent on the museum his father, Louis, had founded. Alexander Agassiz (1835–1910) followed his father in carving out by his own efforts a scientific career of great distinction. He gained the time

for scientific research by building a large personal fortune in a remarkable way. He borrowed some money, bought an interest in a small, unprofitable copper mine at Calumet, Michigan, and became its superintendent. And under his direction it became one of the most prosperous mines that the world had known up to that time.

On November 6, 1888, Professor Ward wrote Alexander Agassiz that he was going to South America, and asked "whether you still want good, well-preserved *fossils* from the Pampa deposits of Argentine Republic." Agassiz was interested. Ward arrived in Buenos Aires in June 1889, and a week later sent Agassiz a telegram costing $93.60. He offered him for $3,500 three unmounted skeletons of rare extinct mammals — Lestodon, Mylodon, and Glyptodon.

This telegram must have created a stir at Harvard. Lestodon and Mylodon were two of the giant ground sloths of the Western Hemisphere. Ground sloths, some of which were the size of elephants, evolved during the Tertiary period and reached their peak during the Pleistocene epoch, which began about two million years ago. They were ponderous, powerful animals with long claws. They moved on all fours, walking on the outer sides of their hind feet and on the knuckles of their fore feet, and could rear up on hind legs and tail (as in the picture) to grasp trees and eat the foliage. A Pleistocene glyptodont was a mammal some 10 feet long wearing on its back a large domed carapace like a turtle's. (It turned out that Ward's glyptodont was not Glyptodon but Panochthus, a different genus of glyptodont.) These and other bizarre mammals had evolved during the time when South America was an island continent; but, after the Isthmus of Panama appeared, they spread also to North America. Unlike the dinosaurs, they were contemporary with prehistoric man.

But *modern* man knew nothing of them until 1789 when a monstrous skeleton was found on an eroded river bank near Buenos Aires and sent to Madrid. Baron Georges Cuvier, in France, studied drawings of the bones and saw similarities with the tiny modern tree sloths. He called it *Megatherium* (great beast). Its characteristics were not well understood until Sir Richard Owen published a notable series of reports in the 1850's. Meanwhile, with the finding of more and more bones in South America (and a few in North America), scientists realized that Megatherium was only one of many genera of ground sloths. For example, Lestodon

was identified by Paul Gervais of Paris in 1865. Around that time a number of museums, including those at Harvard and the University of Rochester, acquired from the British Museum plaster casts of a Megatherium skeleton. But in 1889 museums in the United States still possessed next to nothing in the way of actual bones of these and other extinct South American mammals.

Agassiz wired Ward that he would take the skeletons of Lestodon, Mylodon, and Glyptodon. Ward then closed a deal with the Museo de la Plata, directed by Francisco P. Moreno, whereby Ward acquired the three specimens for $3,000 worth of other skeletons to be sent from Rochester. In explaining this to Agassiz in a letter of July 26, 1889, he said the three skeletons had "nearly every bone present," and, as for those lacking, "I shall here get a plaster copy, which at home can be repeated in wood-carving, — a better material." Before leaving Buenos Aires he bought for $1,240 a less complete skeleton of Scelidotherium (yet another ground sloth), which he offered to Agassiz for $1,740. He packed the four fossils in twelve large boxes and shipped them to New York.

Ward also negotiated for a fifth fossil, a skeleton of Toxodon, a strange hoofed mammal which was somewhat larger than a rhinoceros and so rare that no mounted specimen existed in either Europe or the United States. It had been described originally by Sir Richard Owen on the basis of an incomplete skull found by Charles Darwin in Uruguay during the historic voyage of the *Beagle*. Ward wrote Agassiz that Moreno had one fine mounted specimen and another mountable skeleton lacking the skull. Said Ward, "They will give me this skeleton, with a plaster-cast of skull, for *$2,500*, payable in specimens." This, too, Agassiz bought — for the same price Ward paid for it. As it turned out, the skull was not entirely plaster after all, for Moreno found among the Toxodon's bones a lower jaw, eight-tenths complete, with the teeth; and Ward himself provided the upper teeth (presumably from another Toxodon), which he bought separately in London. He charged Agassiz $40 additional for the teeth.

In all, Agassiz paid Ward $7,780 for the five big fossils, and an additional $3,980 for mounting them in Rochester — a grand total of $11,760. The three ground sloths and the glyptodont (*Panochthus tuberculatus* Owen) were delivered to Harvard in September 1890 after eight months of hard work in Rochester. The

mounted Toxodon (*Toxodon platensis* Owen) was delivered the following year. Today in the fossil mammal room of the Museum, behind a large glass front, may be seen Panochthus, Toxodon, and the ground sloth named *Lestodon armatus* Gervais.

W. T. Hornaday, in his 1896 article about Ward, said that if the professor could be examined analytically, it would be found that "internally he is composed of raw-hide, whale-bone and asbestos," for no ordinary human could have withstood for forty-five years the bad food and bad drinks necessarily encountered by one who had recklessly traveled all over creation. Hornaday said he had often wondered how Professor Ward would "start on his last journey," whether by accident, or by violent illness in some foreign hotel or steamer, or peacefully in old age at home. Ten years later the answer came. In 1906, when Ward was in Buffalo, New York, preparing for yet another expedition across South America, he was killed by a horseless carriage.

12
The Coelacanth

Fishermen are always catching big ones and boasting about it afterward. But possibly the most sensational catch in history occurred in South Africa on December 22, 1938. The crew of a boat trawling in a bay where the Chalumna River enters the Indian Ocean pulled in a pugnacious-looking 127-pound fish of a kind that scientists believed to have been extinct for 70 million years. When the news got around, an authority at the British Museum wrote in the *Illustrated London News* that the event was as surprising as if one had discovered a living dinosaur, and far more remarkable than finding a living mammoth or woolly rhinoceros.

The fish was a coelacanth, pronounced SEE-la-canth. Coelacanths have three layers of oily armor and a lot of sharp teeth. More important, they are "lobe-finned." Two pairs of fins on the underside are rounded, fleshy, and equipped with internal bone structures — that is, the sort of fin that made the evolution of a land limb possible.

During the Devonian period, some 300 million years ago, the lobe-finned fishes appeared. One lobe-finned order was the Dipnoi,

or lungfishes, some of which are still swimming. Another order was the Crossopterygii, and this was much more important because it gave rise to those amphibians which were the first animals to invade terra firma and which were the ancestors of all reptiles, birds, and mammals, including man. The Crossopterygii consisted of the rhipidistians, now almost certainly extinct, and the coelacanths, which were considered extinct until the event of 1938. The rhipidistians, rather than the coelacanths, were our direct ancestors; but in any case the two were closely related. Moreover, fossil coelacanths, about which a great deal is known, show that today's coelacanths of the Indian Ocean have changed very little since Devonian times. Thus, with a little imagination, one can think of the discovery of these fishes in the twentieth century as a wholly

unexpected glimpse of our own awesomely distant past — not in the rocks but in the flesh.

The trawler captain of 1938, a man named Goosen, took his fish into the South African port of East London and delivered it to Margaret Courtenay-Latimer, then the director of the East London Museum. Suspecting that it might be a coelacanth, she notified J. L. B. Smith of Rhodes University, then the leading fish expert of South Africa. He sped to East London, examined the deteriorating carcass, confirmed that it was a coelacanth, and named it *Latimeria chalumnae* in recognition of Margaret Courtenay-Latimer and the Chalumna River. He published a scientific description and circulated posters offering a reward for other specimens.

Fourteen frustrating years passed without a nibble. In 1952 came the second specimen, 1,900 miles away! It was caught in the

Comoro Islands, which lie between Mozambique and Madagascar and which were then governed by France.

By the early 1970's about seventy more coelacanths had been caught by fishermen in the Comoros and preserved for science. Near the shores of those islands the sea bottom plunges sharply, and apparently the creatures live fairly deep and move part-way up the underwater mountainsides at night in search of food. It is believed that they use their fleshy fins to push themselves around—a sort of "walking" as a supplement to swimming. They are usually caught at depths between 500 and 1,000 feet, with a single hook on a single line, in the hours before dawn. They are gray-blue in the sea but turn brownish after death. They do not survive long after capture. Nobody knows why specimen Number 1 was caught so far south in a different environment.

The first two specimens stayed in Africa. Of the first 68 caught (up to October 1971), 22 went to the Muséum National d'Histoire Naturelle (National Museum of Natural History) in Paris, 10 came to the United States, and 36 were scattered to other institutions. One of the Paris specimens, the 18th catch, weighed 209 pounds and was almost 6 feet long. Number 41, caught on August 18, 1965, came to rest at Harvard. Number 44, caught seven months later, on March 14, 1966, was acquired by Yale. The Harvard and Yale specimens arrived in the United States at about the same time, and they were put to entirely different uses.

At Yale's Peabody Museum of Natural History, an important center of research on coelacanths, Keith S. Thomson (Harvard Ph.D. 1963) and his colleagues wanted a specimen they could dissect. At Thomson's request the authorities in the Comoros froze Number 44 and got it to America in a refrigerated cargo ship in less than two months. Investigators gathered around a laboratory table at Yale on Memorial Day 1966 and made the first detailed examination of a fresh coelacanth. Much was learned. For example, Thomson reported that the skull is "characterized by a set of joints separating the braincase into two parts" and is "movable through some eight to ten degrees, producing one of the most curious mechanisms of jaw movement known in vertebrates."

For years there was a scientific controversy over how the species gives birth. The Yale group suggested that the fish is ovoviviparous, that is, the egg is fertilized internally, as in some sharks, instead of externally, as in most other fishes. In 1976 this hypothesis was

confirmed at the American Museum of Natural History when scientists opened a female specimen that had been in the museum since 1962 and discovered, to their surprise, five well-developed embryos.

Meanwhile the Harvard specimen had been acquired for exhibit rather than for dissection. The central figure in this undertaking was Henry B. Bigelow (1879–1967), a mainstay of the Agassiz Museum for nearly seventy years, also the founder and first director of the Woods Hole Oceanographic Institution. He decided in 1965, about two years before his death, to buy a coelacanth for the Museum, and he stipulated that it be put on permanent display.

The price paid to the Comoroan authorities was $600. The freight charge and the building of a special tank at the Museum added another $400 or so. The specimen, a male, about 4 feet long and weighing 50 pounds, was caught off the town of Djomani near the northern end of Grand Comore. The name of the fisherman is not known. Immersed in formalin in a wooden box lined with zinc, the fish traveled by boat to Mombasa, Kenya, where it somehow got misplaced and was lost for several months. Finally arriving at Boston in the spring of 1966, it was put into water until the formalin was soaked out, then was placed in its present tank of alcohol, at which point the Museum gave a party in its honor.

13

George Washington's Pheasants

Between the winning of the Revolutionary War and the framing of the Constitution, George Washington had a few years at the place he loved best, Mount Vernon. Toward the end of this interlude, just before the Constitutional Convention, he took part in a curious episode in which two inhabitants of Mount Vernon, namely two pheasants, preceded him to Philadelphia. The birds now stand in the Museum of Comparative Zoology. Their travels make a lively chapter in the history of museum keeping in America.

The episode began in November 1786, when Washington received a strange cargo from his friend the Marquis de Lafayette in France — one jackass, two female asses, one partridge (another had died on the way), and seven pheasants. He was expecting the asses,

having requested Lafayette to procure them from Malta. The birds he was not sure about. A newspaper in Baltimore, where the menagerie had first landed, had said the pheasants cost Lafayette sixteen guineas a pair. Washington was embarrassed over this report and hated to think that it would get back to Lafayette; for Jacques Campion, Lafayette's messenger who brought the cargo to America, told the General that the pheasants came from the King's Aviary as a present to the Marquis for Washington.

Louis XVI, then about six years away from the guillotine, enjoyed hunting more than governing. One of his favorite shooting grounds was a large tract overlapping the Bois de Boulogne. Rare golden pheasants and red partridges had been raised there for decades and had become numerous and famous. On a single hunt in 1783, Louis was said to have killed more than a hundred birds. Why he decided to send some live ones to Washington is not known. Possibly Lafayette had told him that the General was a fox hunter and might like a change of pace.

Washington, in his diary on November 27, described "my Chinese Pheasants" thus: "a Cock and Hen of the Gold Pheast.; a Cock and Hen of the Silver Pheast.; a Cock and 2 Hens of the French Pheast."

It was not long before Charles Willson Peale of Philadelphia, artist, soldier, naturalist, and relentless collector, began a correspondence with the General. Here are the pertinent excerpts, misspellings and all:

Peale to Washington, December 31, 1786. — I have lately undertaken to form a Museum and have acquired the means of preserving in the natural forms, Birds, Beasts and Fish, my Intention is to collect every thing that is curious of this Country, and to arange them in the best manner I am able, to make the Collection amusing and Intructive, thereby hoping to retain with us many things realy curious which would otherwise be sent to Europe.

Having heard that you have been presented with some beautiful Birds of China I take the liberty of requesting in Case of the death of any of them, to have them packed in wool and put in any sort of packing Case, and sent by the Stages to me, and I will preserve them in the best manner I am able, and either send them back to you, or place them in any Museum, as your Excellency may please to direct.

Washington to Peale, January 9, 1787. — Your Letter of the 31st of Decembr came duly to hand. I cannot say that I shall be happy to have it in my power to comply with your request by sending you the bodies of my Pheasants, but expect that it will not be long before they will compose a part of your Museum, as they all appear to be drooping. One of the Silver pheasants died sometime before the rect of your letter, & it's body was thrown away, but whenever any of the others make their exit, they shall be sent to you agreeably to your request.

Washington to Peale, February 16, 1787. — You will receive by the Stage the body of my Gold Pheasant, packed up in wool agreeable to your directions. He made his Exit yesterday, which enables me to comply with your request much sooner than I wished to do. I am afraid the others will follow him but too soon, as they all appear to be drooping; whether it is owing to their being confined, or to the Climate, I am not able to say: I am very desirous of giving them Liberty, but the danger of their being taken by the Hawkes prevents me.

Peale to Washington, February 27, 1787. — Your obliging favor of the Body of the Golden Pheasant, I have received in good condition, although by a Stage two Days after the receipt of your Letter. The delay was vexatious, yet I am richly paid in being able to preserve so much beauty. Before this time I had thought those Birds which I have seen in the Chinease paintings were only works of fancy, but now I find them to be only aukerd Portraits.

I am sorry that their lives cannot be preserved. I did not find the body very lean, the Musels of the Thighs were strong, which with smallness of the Wings, makes me think that they run fast and fly but little. When you have the misfortune of loosing the others,

if the weather should be warm, be pleased to order the Bowels to be taken out and some Pepper put into the Body, but no Salt which would spoil the Feathers. And if you please to have some directions put on the box which would prevent delay on the Passage of them.

Washington to Peale, March 13, 1787. — I have received your letter of the 27th Ulto. acknowledging the reception of the body of the Golden Pheasant. I have sent by the Dolphin Captn. Steward the body of a French hen Pheasant which died this day. I chose this mode of conveying it rather than by the Stage, as the Packet calls here to receive some things for Philadelphia; and I think, all circumstances considered, that it will meet with as quick and safe conveyance as if it went by land.

Peale to Washington, March 31, 1787. — Your obliging favor of the 13th I received on the 28th. The Pepper I believe preserved the body from being thrown overboard. My Anticeptic Powders I hope will preserve the remains, yet not so perfect as I could wish as many of the feathers fell off.

I believe the conveyance by the stage waggon with a particular direction will be the most certain.

Thus ends the correspondence about the pheasants. In May, General Washington went to Philadelphia for the Constitutional Convention. While there he sat for a portrait by Peale, and may have seen his two birds mounted in Peale's Philadelphia Museum. By the time he returned to Mount Vernon in September the rest of the drooping flock presumably had perished in their cage and been discarded.

Peale's museum became the most famous in America. It was a private enterprise, and when he died in 1827 his sons carried it on; but it failed in 1846, and the natural history collections were sold in 1850. Half went to P. T. Barnum's American Museum in New York, which was destroyed by fire in 1865. The other half was bought by Moses Kimball, owner of the Boston Museum. In the 1890's the Boston Museum gave the Peale collections to the Boston Society of Natural History, which in 1900 sold most of them to a man in Newtonville, Massachusetts, who stored them in his barn. The Society bought them back, but by now they were in bad shape.

The Society's holdings were transferred to Harvard in 1914,

after which Walter Faxon made a study of the remains and succeeded in identifying some of the birds as Peale exhibits. But the only surviving *labels* from the Peale museum were two thin wooden ones fastened to a pair of pheasants. These labels, which are on exhibit, say that these pheasants were presented by George Washington. At Harvard the birds were remounted by George Nelson. Despite Washington's puzzling references to "French Pheasants," both the male and female surviving from Peale's museum are specimens of the Golden Pheasant (*Chrysolophus pictus*). Today they are anything but "drooping."

14

Steller's Sea Cow

Sea cows are marine mammals, bearing some resemblance to seals or even small whales but actually, in their ancestry, more closely kin to elephants. Like elephants, they are vegetarians. The order to which they belong is called *Sirenia* because of a supposed connection with the sweet-singing sirens of mythology, but they are not alluring to look at. Existing sea cows are the dugong and the manatee which are found on tropical shores. Until about two hundred years ago a larger form, Steller's Sea Cow, lived in the western part of the Bering Sea between the Kamchatka peninsula and the end of the Aleutian chain. A superb and exceedingly rare composite skeleton of this curious species (*Hydrodamalis gigas*), 18 feet 10 inches long, hangs from a ceiling in the Agassiz Museum.

Steller's Sea Cow was discovered in 1741 under tragic circumstances. A ship commanded by Vitus Bering, the Danish explorer in the Russian navy for whom Bering Strait and the Bering Sea were named, was wrecked on an uninhabited island which also was to bear his name (Bering Island is the largest of the Commander islands). Many crew members were dead or dying of the scurvy. In all, 32 of the 78 in the company died of the dread ailment. Bering himself succumbed a month after reaching shore. Among those who survived was a brilliant young German-born naturalist, Georg Wilhelm Steller, who, on this same voyage four months earlier, had been in all likelihood the first white man ever to set foot

on Alaska. On Bering Island, when not helping to care for the sick, Steller studied the wildlife, especially the sea cows. He could see them every day from his hut, moving through the shallow water in herds, grazing gluttonously on seaweed. In the summer of 1742 he dissected one of the animals, which he estimated at about 8000 pounds; its stomach, stuffed with seaweed, was 6 feet long and 5 feet wide.

Finally the survivors built a boat and reached the Asiatic mainland. Steller died in Siberia four years later at age 37. Hunters and fur traders began visiting the Commander islands and soon killed off the sea cows. The species has been considered extinct since 1768.

In 1882 a young scientist named Leonhard Stejneger was sent to Bering Island by the Smithsonian Institution. In a long stay there he saw no live sea cows, but he brought back a large collection of their bones, and the National Museum presented to Harvard the composite skeleton now on exhibit. Stejneger never could get Steller out of his mind. In 1936, more than fifty years after following Steller's trail on Bering Island, he published a biography entitled *Georg Wilhelm Steller.*

15

The Sea Floor near Cincinnati

Four hundred and fifty million years ago, well along in the Ordovician period, there were no living things on the dry land or in the air. Yet life was already of vast antiquity, having existed many times four hundred and fifty million years. In the seas, which then covered much more of the earth's surface than they do today, soft-bodied animals, with and without shells, came in many sizes, shapes, and perhaps colors. An imaginative life-size portrayal of some of these extinct creatures, as they conceivably might have looked on a shallow sea floor near what is now Cincinnati, Ohio, was put on exhibit in the Museum in 1963.

In that stage of the Ordovician, and probably for scores of millions of years, the rulers of the animal kingdom were the cephalopods, a group of mollusks which today includes the squid, octopus, and nautilus. The name cephalopod ("head-feet") comes

from the peculiar circumstance that the head and "feet" (often called arms or tentacles) are connected. The largest cephalopod at the time of our exhibit was *Endoceras*, a meat-eater whose head and tentacles protruded from the open end of a straight conical shell 10 or 15 feet long. In the preceding Cambrian period the largest of all creatures had been the trilobite, a crusty-backed, many-legged, early form of the Arthropoda ("jointed feet"), which today includes crabs, lobsters, insects, and spiders. Many species of trilobites still existed in the Ordovician period, and in general were larger than before, but the trilobite was no longer king of the sea.

ENDOCERAS MAULING A TRILOBITE

Thus it is symbolic that the sea-bottom diorama in the Museum shows an *Endoceras* about to devour an *Isotelus*, a species of trilobite. Our picture shows this encounter. The trilobite is upside down amid the tentacles. Only the front part of the cephalopod is shown in the diorama and in our illustration. The two "flowers" are actually animals called crinoids, or sea lilies.

The diorama, which also includes extinct species of corals, worms, starfish, clams, brachiopods, and other animals, is based upon fossils that have been discovered in various layers of the Ordovician shales and limestones in the Cincinnati area. He who dares to picture life at such a distance must hypothetically — and artis-

tically — try to fill in the gaps of knowledge. For example, the colors are imaginary. And the soft parts of the animals, not being preserved in the rock, had to be reconstructed by comparison with the nearest living relatives; as an illustration, *Endoceras* is distantly related to today's pearly nautilus, a predator with big eye and tentacles that lives in a spiral, chambered shell.

Certain species of *Endoceras* went on to get much bigger than the model shown in the sea-floor diorama. The Museum also has on exhibit an enormous, cone-shaped, Ordovician fossil, perhaps the largest fragment of an "endoceroid cephalopod" ever exhibited. The animal is also called a nautiloid (meaning "like a nautilus") but it is not spiraled like a modern nautilus. The fragment, looking somewhat like a tapered log, measures 9 feet 10 inches and is so far from complete that the whole shell must have been over 26 feet long, and the whole animal, counting the tentacles, was probably at least 31 feet.

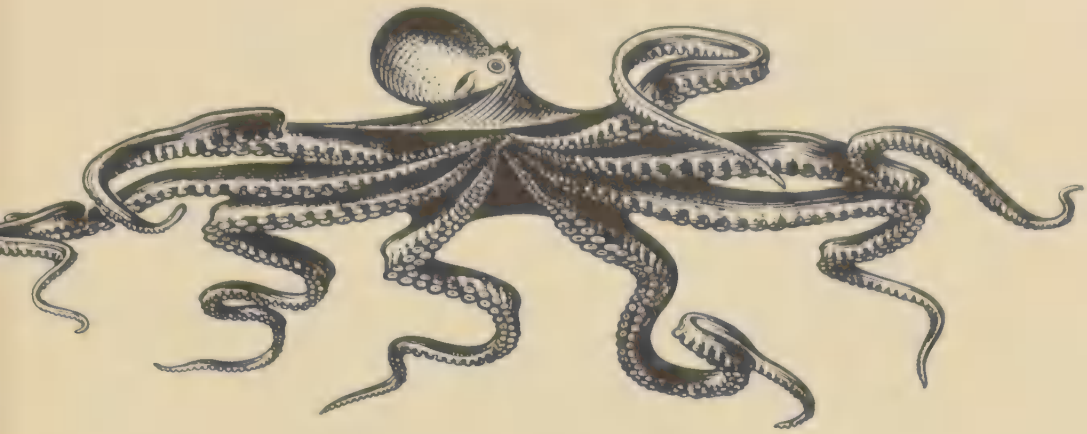
As for the sea-floor diorama, it was donated by Mrs. Edith Reid Stetson in memory of her husband, Henry C. Stetson, Harvard undersea geologist and oceanographer, who died in 1955 aboard the research vessel *Atlantis*.

No fish swim in this Cincinnati sea. And yet, apparently, around this very time, 450 million years ago, the first fish-like vertebrates were appearing in the waters that covered Colorado.

16

The Paper Octopus

Among the most famous models of animals ever constructed for museums in America were the replicas of the Giant Squid and Giant Octopus made at Yale in the early 1880's by J. H. Emerton under the direction of A. E. Verrill, a noted zoologist. Using papier-mâché, rubber, and other materials, Emerton made three life-size copies of a squid 40 feet long, counting the two 30-foot tentacles. He made two copies (presumably life-size) of a Pacific Ocean octopus with arms 16 feet long. The only one of these five noble models that was still on public exhibit in the mid-1980's was the



huge reddish octopus, or "devilfish," suspended from a ceiling in Harvard's Agassiz Museum and pictured here.

Octopuses and squids are mollusks, along with the less active snails, oysters, and clams. The octopuses and squids are the jet-propelled hunters of the sea. They are cephalopods — their arms sprouting from their heads. (See preceding chapter.) They have big eyes which are similar in construction to vertebrate eyes; blue blood; three hearts; jet propulsion by means of a movable funnel through which they force sea water; the ability to change color as suddenly as an electric sign; and the ability to eject a cloud of black ink that hangs in the water in approximately their own shape, to the confusion of enemies. Octopuses and squids have eight arms, and squids in additon have two tentacles much longer than their arms. Both animals range in size from a few inches to gigantic.

A. E. Verrill, an authority on invertebrate (backboneless) sea animals, had gone to Yale from the Agassiz Museum in 1864. James Emerton, from Salem, Massachusetts, became Verrill's assistant in 1880. He was a scientific artist and also a spider expert — two accomplishments that converged at his wedding ceremony, where his bride wore a white silk gown heavily embroidered with his drawings of New England spiders. On the squid and octopus models Emerton got help from William Palmer of the National Museum of Natural History (part of the Smithsonian Institution), who was sent from Washington for the purpose. Their first squid and octopus became the property of that museum and were rushed to London for the International Fisheries Exhibition of 1883, where

they won a silver medal and no doubt amazed thousands. Back in Washington, for many decades, they probably amazed millions more.

The other two squid models were constructed for Yale and Harvard. The species depicted in all three was *Architeuthis princeps*, which was first described by Verrill himself and is believed to be the largest invertebrate animal that ever lived, sometimes reaching 50 or 60 feet in total length with tentacles extended. Emerton worked from measurements and descriptions of a squid washed ashore during a storm in September 1877 at Catalina, on the east coast of Newfoundland. In recent decades the three squid models have gradually fallen into disrepair and have been taken down. The Peabody Museum at Yale replaced its paper model with one made of fiberglass. In 1973 the Agassiz Museum, after exhibiting its Giant Squid for ninety years, gave it to the New England Aquarium, which stored it away and hoped to renovate it.

As for the Giant Octopuses, the model that did not go to London and Washington was built to fill an order from the Agassiz Museum. From the beginning there was uncertainty about the twin models.

First, what species was this? For a long time zoologists did not agree on its name. The National Museum labeled its model *Octopus punctatus*, and that also is what Emerton called the species when he sent Harvard a bill for $300 in May 1884. But the Harvard scientists, either then or later, labeled their model *Polypus hongkongensis*. Those names are no longer used for this largest of all species of octopus. Mollusk experts have settled on the name *Octopus dofleini*.

Second, Verrill and Emerton did not have a particular specimen to follow. They had to work from several sources. They were uncertain about coloring, especially of the eyes. The specimens they inspected were small. But they had testimony from William H. Dall, a Smithsonian zoologist, that a specimen had actually been measured and found to have arms up to 16 feet long; and on this authority they made the largest arms 16 feet and the shortest 13. This still seems to be the biggest specimen ever described by scientists, though the models were created nearly a century ago.

The one in the National Museum deteriorated and was quietly discarded. The one at Harvard looks alive enough to keep going a while longer.

17

The Dinosaur Egg

The Museum has obtained many specimens by sending costly expeditions to far places, but sometimes a prize falls unexpectedly into its lap. The 75,000,000-year-old dinosaur egg on exhibit was acquired through a series of incidents involving an anthropologist, an art-lover, a botanist, and a twelve-year-old boy.

In 1957, Dr. Henry Field, Harvard anthropologist, took his wife on a pilgrimage to Aix-en-Provence, in southern France, so that she could visit the countryside immortalized by Cézanne. At the Château Noir, where the painter used to spend week-ends, Poussiqué Tessier, son of the owner, offered to show Dr. Field his private museum. The boy opened a box and proudly announced, "These are pieces of dinosaur eggs." This seemed incredible. At that time the only positive discovery of dinosaur eggs that was widely known in the scientific world had taken place in the Gobi Desert of Mongolia in 1922, when a connection had been definitely established between some fossil eggs and the small dinosaur *Protoceratops*. But Field, visiting the Musée d'Histoire Naturelle (Museum of Natural History) in Aix-en-Provence the next day, found that the boy was right. This museum possessed a number of eggs which, with near-certainty, had been linked to the large dinosaur *Hypselosaurus*, and tens of thousands of fragments were still to be seen in a Cretaceous deposit not far away.

What had happened was this. The director of the Musée, Raymond Dughi, a botanist, had recently been reading an article on lichens in an old periodical. He went to answer the telephone, and when he returned, the wind had blown over some pages, uncovering an article written by Philippe Matheron in 1869. In that very locality Matheron had found some egg fragments which he had cautiously attributed either to *Hypselosaurus* or to a large bird of some sort. Matheron's work had not been entirely forgotten, for several paleontologists in the 1920's and 1930's had become interested in his find because of the Mongolian discovery; but it was Professor Dughi, no paleontologist at all, who set the neighborhood up as the world's greatest source of dinosaur eggs. He became so

excited over the Matheron article that he went out on an egg hunt — and found an astonishing number.

Field suggested to Dughi that the Harvard Museum of Comparative Zoology should have one for study and exhibition, and a few days later a splendid specimen was flown to the Museum as a gift from the Musée.

Hypselosaurus eggs are believed to be as large as those of any dinosaur. Yet the size is ridiculously small in comparison to the full-grown member of the species. The Harvard specimen is 7⅞ inches long, but, if it had hatched, it might have produced a creature 40 feet long.

18

The Right Whale

In 1620 when the *Mayflower* crossed the mouth of Cape Cod Bay on its way to Plymouth, whales were so numerous that the master and mate of the ship resolved to return and go a-whaling. Whether they did or not, many others whaled in these New England waters. The species they hunted (now known as *Eubalaena glacialis*) was called the right whale because all the other kinds were then considered the wrong ones to hunt; the right whale yields more oil than other kinds, is fairly easy to harpoon, and floats when dead. Besides, the right whale has in lieu of teeth a large screen of whalebone, or baleen, which was commercially valuable because it was used in women's corsets and as buggy whips and other articles. The whale uses it for a sieve, through which it forces out sea water, retaining the multitudes of tiny sea creatures that are its food.

The right whale never seems to have been as numerous around Cape Cod as, say, finbacks and humpbacks; but, since it was more valuable, it was hunted whenever found until early in the twentieth century. It is now internationally protected. Every year, toward the end of March, groups appear for four to eight weeks near Cape Cod. During the rest of the year they are less numerous, although on rare occasions one can see as many as seventy, even a hundred, in a

single day. But they are still too few to hunt. A modern whaling flotilla could exterminate them in a few weeks.

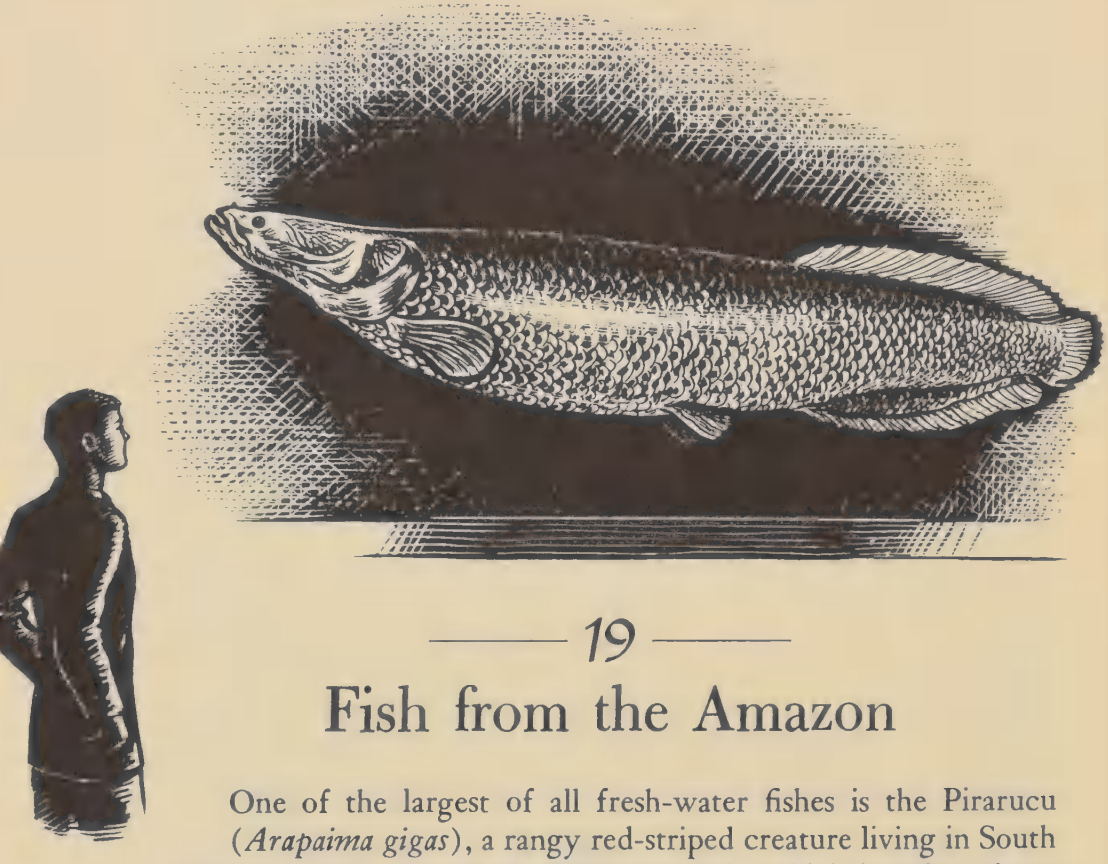
The rare skeleton of a right whale now exhibited with other whale skeletons in the Museum was killed in April 1864 a few miles off Gurnet Light, near Plymouth.

This whale had been seen earlier by inhabitants of Provincetown, and in the excitement the little schooner *Wasp* set out from there in search of it with two whale boats in tow. The captain, Robert E. Smith, offered $10 for the first sight of the animal. Two boys, D. W. Atwood and James P. Smith, climbed to the mastheads. After a long vigil Atwood saw the whale; he told Smith, and both shouted "There she blows!" (each winning half the bounty). The whale was lying quietly with part of its head above water. The two whale boats hastened to it. The leader of the first boat put in the first harpoon, and the whale began rolling in the water. The leader of the second boat put in another harpoon, and the victim settled out of sight. Surfacing again, it struck the second boat with its snout, tipping it on end and throwing the crew of six into the sea. These men climbed onto the bottom of their boat and were rescued from the *Wasp*. Meanwhile the crew of the first boat lanced and killed the whale. It was tied alongside the schooner and towed to Provincetown harbor, where it was grounded.

The stripping of the blubber began, but Sunday intervened and the hot sun caused a great waste of oil during the day of idleness. In all, more than 80 barrels of oil was boiled from the blubber, and 1,001 pounds of whalebone was taken from the mouth and sold for $1,001. The whale was 47 feet long. Through the influence of Captain N. E. Atwood of Provincetown the carcass was obtained for the Museum of Comparative Zoology, which was then only five years old. Louis Agassiz sent two assistants to preserve the skeleton, one being his young son, Alexander, the other Professor William H. Niles. Laying bare the bones of a fast-deteriorating whale is a task that is never forgotten. Twenty-five years later, Alexander Agassiz wrote in his annual report for 1888–89, "In the early days of my Natural History career, I had the unpleasant task of assisting in the preparation of the skeleton." He wrote this on the occasion of the hanging of the skeleton from a ceiling in the Museum. The bones, after many years of storage, had been mounted at Ward's

Natural History Establishment in Rochester and were ready for exhibition. The skull with its seven-foot-long baleen was a clever restoration, since the original baleen had been sold by the whalers.

Our story of the whale's capture is based on a letter written in 1912 by J. Henry Blake, who had been Louis Agassiz' personal artist and had reconstructed the battle in a series of sketches which are still on display in the Museum. Before sending his 1912 account he checked it for accuracy with the only surviving member of the crew — D. W. Atwood, one of the boys who had cried "There she blows" on that April day in 1864.



19

Fish from the Amazon

One of the largest of all fresh-water fishes is the Pirarucu (*Arapaima gigas*), a rangy red-striped creature living in South American rivers. It has an uptilted mouth, which it pokes above the surface to gulp air, and a bony tongue so abrasive the natives use it as a rasp. It is a food fish of some importance in the Amazon and Orinoco basins.

The Agassiz Museum asked the Emilio Goeldi Museum of Belém, Brazil, to procure a large specimen. Near the mouth of the Amazon a Pirarucu of near-record size was caught — 7 feet 2

inches, 165 pounds. It was frozen and hauled in the steward's refrigerator of the *Mormactern* to New York, where it was transshipped to Boston, arriving in January 1961.

So far, so good. The taking of the giant from the river had presumably been accomplished with no casualties except the fish itself. But several museum officials narrowly missed death in an avalanche as they unloaded the specimen from a station wagon at the back door of the Museum. A roar overhead — the men leaped for their lives — the fish fell into a snowbank — and the top of the car was crushed beneath about half a ton of ice from the roof.

The Pirarucu, which belongs to a primitive fish family, does not mount well; its scales are soft. Joseph A. O'Leary, then the Museum's exhibit technician, made a plastic cast, colored it, and placed it on exhibit – a perfect replica of the fish from the Amazon.

20

Early Reptiles

Archer and Baylor Counties in northern Texas – favorite digging grounds for Harvard scientists – are among the world's leading sources of knowledge about early reptiles. The two oldest orders of reptiles are the cotylosaurs and pelycosaurs, which lived more than 200 million years ago, in late Carboniferous and early Permian times, when dinosaurs were still far in the future. Some rare skeletons of these primitive creatures are on exhibit in the Museum.

Of all known reptiles the cotylosaurs are the most primitive in body structure. They are called "stem reptiles" because they are probably the ancestral stock from which all later reptile groups arose. The species *Diadectes tenuitectus*, however, is a member of a side branch, evidently not an ancestor of later reptiles. The *Diadectes* skeleton on exhibit was excavated in Baylor County in 1882 by C. H. Sternberg, an employee of the Museum. It was mounted by George Nelson in 1944.

The pelycosaurs, which were direct descendants of the cotylosaurs (and also to some extent contemporaneous with them) form a major group in the evolution of land vertebrates. Though they are not in the direct line of descent to the dinosaurs and other major reptiles, they represent an early stage in the beginning of mammal-like forms.

Alfred S. Romer, the director of the Museum from 1946 to 1961, who identified and named about twenty species of pelycosaurs, concluded that a carnivorous suborder of pelycosaurs was in all probability the ancestor of the therapsids, mammal-like reptiles which later gave rise to the earliest mammals. This does not mean that the pelycosaurs exhibited in the Museum were in that direct line—they evidently were not. Nevertheless, the following skeletons are of special interest in the study of pelycosaurs.

1. *Edaphosaurus boanerges.* The superb Harvard skeleton, 8 feet 2 inches long, is a composite mounted from bones collected in 1934–36 by Romer, R. V. Witter, and Llewellyn I. Price at one of their digs in Archer County. The particular locality was the prolific "Geraldine bonebed," which had been discovered by Dr. and Mrs. Romer in 1932. The genus *Edaphosaurus* had long been known; it is called the "ship lizard" because it has a sort of sail down the length of its back, supported by long bony spines which have on them small cross-bars, somewhat like yardarms. The excavations at Geraldine enabled Romer to describe this particular species correctly for the first time, and he named it *boanerges* in 1940.

2. *Dimetrodon milleri.* This skeleton, 5 feet 8 inches long, was collected in Archer County in 1936 by a Harvard field party led by R. V. Witter. The genus *Dimetrodon*, discovered by E. D. Cope in 1878, is the best-known of all the pelycosaurs. Like the "ship lizard," it has a sail on its back. The new species, *milleri*, one of the smallest and

most primitive of dimetrodonts known, was named by Romer in 1937 in honor of Curator Paul C. Miller of the Walker Museum, University of Chicago. The skeleton has been adopted as the symbol of the Museum of Comparative Zoology.

3. *Ophiacodon uniformis.* The Harvard skeleton, 4 feet 11 inches long, was also found by the Witter party in Archer County in 1936.

This species is a very primitive pelycosaur, which had been previously known from fragments only.

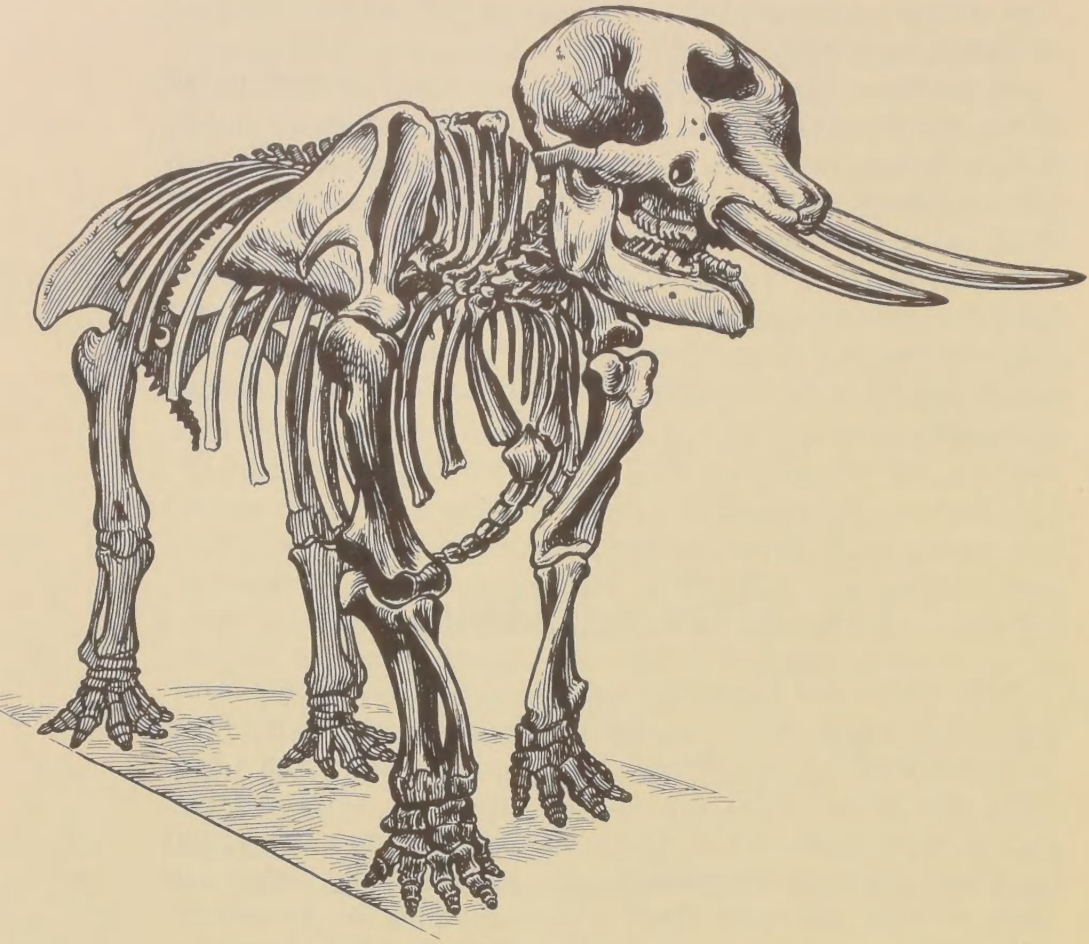
Alfred Romer died in 1973, just short of eighty. During his last fifteen years he took the lead in discovering and opening up the rich Middle Triassic fossil beds of Argentina and thus pointed the way toward filling a major gap – around 200 million years ago – in the fossil record of four-footed animals. In his honor, on February 29, 1984, the Museum opened the Romer Hall of Vertebrate Paleontology, containing the early reptile skeletons, the mighty Kronosaurus, the turtle Stupendemys, the dinosaur Plateosaurus, the coelacanth, some fossil fish collected by Louis Agassiz, and other rare sights.

21

The Harvard Mastodon

Near what is now Hackettstown, New Jersey, five Mastodons — four adults and a calf — met death from causes unknown. They somehow were buried, possibly engulfed after grazing into a bog. More than 25,000 years later, in the autumn of 1844, a farmer named Abraham Ayer found their skeletons beneath a dried pond as he was digging up rich swamp earth to use as manure. Only one of these skeletons has come down to us in anything like its entirety. Most of the bones of the others either crumbled to dust or were lost through carelessness and ignorance.

At that time, though many Mastodon bones had been found in the United States, only three complete skeletons were on exhibition in museums. (The first Mastodon skeleton ever exhibited anywhere had been dug up in 1801 near Newburgh, New York, by Charles Willson Peale of Philadelphia.) A group of 126 citizens of Boston, Cambridge, and Salem gave the money to acquire the Hackettstown remains, and donated them to Harvard College in 1846. (The original plaques listing these citizens are still in the case with the Mastodon.) The first attempt at setting up the skeleton was inaccurate, and Dr. John Collins Warren, professor of anatomy at Harvard, was commissioned to improve it. With the aid of his assistant, a Mr. Ogden, he made a careful comparison with his own famous Mastodon (which had been unearthed at Newburgh in



1845 and is now in the American Museum of Natural History) and with a modern elephant, and mounted the Harvard specimen. He used cork for the cartilages and the missing foot bones. The skeleton was taken apart and mounted again in 1960 by Arnold Lewis, Museum preparator. The specimen is pictured here. Its species is *Mastodon americanus* Kerr.

Mastodons were comparable in size to modern elephants, though they were stockier in build and had longer tusks. Both Mastodons and Mammoths were numerous in America, and both became extinct perhaps 25,000 years ago. An early discovery of Mastodon bones near Albany, New York, in 1705 caused Cotton Mather to speculate that they might have belonged to a gigantic human, as implied in Genesis 6:4, which says "There were giants in the earth in those days."